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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

VALENCIA, DANIEL E.

ART UNIT	PAPER NUMBER
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2874

DATE MAILED: 02 04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/024.996

Applicant(s)

REYNOLDS ET AL

Examiner

Daniel E Valencia

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) ☐ This action is FINAL.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Inventorship*

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "said grating". There is insufficient antecedent basis for this limitation in the claim. The Examiner is of the opinion that there is a typographical error and the instant claim should depend on claim 4.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 7, 8, 12, and 14-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang U.S. Patent No. 4,725,113. Refer to the appropriate drawings or parts of the specification. Regarding claims 1, 2, 3, 12, and 14-16, Chang discloses an optical communication system incorporating a birefringent optical transmission fiber (fig 5) provided with means for controlling the birefringence (62, 64, etc.) of the fiber; a sensor (50) for sensing a difference in group velocity of orthogonal polarization states of optical signals traveling in the fiber; an error signal generator for generating an error signal indicative of the sensed difference (col. 6); said means for controlling the birefringence of the fiber being responsive to the error tend to reduce the sensed difference in group velocity to zero, whereby to compensate for polarization mode dispersion in said fiber. Although Chang does not explicitly state that the device is used to compensate for mode dispersion, it would be inherently disclosed in the reference. Chang further discloses that the means for controlling the birefringence of the fiber are mechanical (56-58) and the fiber is tapered (col. 7, lines 35-40) over at least part of its length, as mentioned in instant claims 7 and 8.

Claims 3, 4, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Strasser U.S. Patent No. 6,137,924. Refer to the appropriate drawings or parts of the specification.

Application/Control Number: 10/024,996  
Art Unit: 2874

Regarding claims 3, 4, and 6, Strasser discloses a birefringent optical transmission fiber (fig 3 and 4) provided with means for controlling the birefringence of said fiber (col. 1, lines 63- col. 2, lines 5), whereby to compensate for polarization mode dispersion in the fiber, wherein the means for controlling birefringence comprises a non-linear fiber grating (col. 1, lines 24-25) written into the fiber whereby to provide a means of imposing a differential time delay (col. 2, lines 10- bottom) to orthogonal polarization states arising from the effects of polarization mode dispersion, such as to compensate for PMD, and wherein the (col. 2, lines 40-45) grating is a chirp type grating.

Claims 3, 5, and 9, are rejected under 35 U.S.C. 102(b) as being anticipated by Turpin U.S. Patent No. 5,309,540. Refer to the appropriate drawings or parts of the specification. Regarding claims 3, 5, and 9, Turpin discloses a birefringent optical transmission fiber provided with means for controlling the birefringence of the fiber (col. 2), whereby to compensate for polarization mode dispersion in the fiber, wherein the birefringence is imposed in the fiber by holes positioned around the core, and wherein the holey fiber comprises micro-holes filled with thermally sensitive material creating stressing rods to impose a mechanical stress (col. 40-50) by which to control birefringence.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Epworth U.S. Patent No. 6,381,388. Refer to the appropriate drawings or parts of the specification. Epworth discloses a chromatic dispersion compensator that teaches a majority of the limitations of the claims. Regarding claims 3 and 10, the reference teaches a fiber for compensating polarization mode dispersion, provided with a means to provide a thermal gradient to at least part of the length of optical fiber (col. 3). Epworth discloses that it is advantageous to use a thermal gradient, because it introduces a chirp and measure of dispersion (col. 2, lines 50-65). Although the reference does not explicitly state that the device controls birefringence of the fiber, this would be an inherent property of the device. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Epworth's device to control birefringence of the optical fiber.

Claim 11 and 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turpin in view of Libori U.S. Patent Application Publication No. 2002/0061176 A1. Refer to the appropriate drawings or parts of the specification. Turpin, as applied above discloses an optical fiber sensor and a manufacturing process for making the same with a majority of the limitations of the present invention. Turpin however, fails to explicitly state that the electro-optic interaction of the mode with the holes causes mode shaping.

On the other hand, Libori discloses a dispersion manipulating fiber that teaches the limitations that the Turpin reference lacks. Specifically regarding the claims, Libori discloses that the mode propagates down the fiber and interacts with the holes causing the mode to change

Application/Control Number: 10/024,996

Art Unit: 2874

shape (paragraph 50-52). Both references teach holey fibers with varying birefringence for dispersion compensation. Further, Libori teaches that shaping the mode is desirable in order to avoid coupling losses (paragraph 50). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Turpin with Libori to produce a device in which the propagating signal interacts with the holes of the fiber, in order to shape the mode.

### *Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bricheno U.S. Patent No. 4,756,589 discloses an optical coupler utilizing low or zero birefringence optical fibers and a method of making the same, wherein the fiber is tapered.

Kringlebotn PCT International Application Publication No. WO 99/32863 discloses a method for application of an optical fiber as a hydrostatic pressure sensor, wherein the fiber controls birefringence with stress rods.

Chowdhury U.S. Patent No. 6,417,948 discloses a variable delay device for an optical component such as a polarization mode dispersion compensator, wherein the device controls the birefringence of the fiber.

Bethelot U.S. Patent Application Publication No. 2002/0122625 discloses a compensation of polarization mode dispersion of a grating written in an optical fiber, wherein the grating controls the birefringence of the optical fiber.

Application/Control Number: 10/024,996  
Art Unit: 2874

Inniss U.S. Patent No. 5,559,907 discloses a method of controlling polarization properties of a photo-induced device in an optical waveguide, wherein a grating controls the birefringence of the waveguide for dispersion compensation.

Canneau U.S. Patent No. 5,732,179 discloses a birefringence - free semiconductor waveguide.

Aronson U.S. Patent No. 5,452,314 discloses controllable birefringence acoustic optic tunable filter and a laser tuned by the same, wherein the grating controls the birefringence of the waveguide.

Koplow U.S. Patent Application No. 2002/0159139 discloses a polarization maintaining optical fiber amplifier employing externally applied stress-induced birefringence.

Chien U.S. Patent Application Publication No. 2002/0168165 A1 discloses an all fiber polarization mode dispersion compensator, wherein the device included stress rods to control birefringence.

Jacob U.S. Patent No. 6,266,457 discloses a system and method for differential group delay, wherein the device controls the birefringence of the fiber.

Epworth U.S. Patent No. 6,271,952 discloses a polarization mode dispersion compensator.

Eggleton U.S. Patent Application Publication No. 2002/0071646 A1 discloses a waveguide incorporating tunable scattering material, wherein stress rods are adjustable and can control birefringence.



Application/Control Number: 10/024,996  
Art Unit: 2874

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel E Valencia whose telephone number is (703)-305-4399. The examiner can normally be reached on Monday-Friday 9:30-6:00.

The fax phone numbers for the organization where this application or proceeding is assigned are (703)-308-7724 for regular communications and (703)-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-0956.



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January 22, 2003

